

Omaha Public Power District  
444 South 16th Street Mall  
Omaha, Nebraska 68102-2247  
402/636-2000

July 22, 1991  
LIC-91-0091L

U. S. Nuclear Regulatory Commission  
Attn: Document Control Desk  
Mail Station P1-137  
Washington, DC 20555

Reference: Docket No. 50-285

Gentlemen:

Subject: Licensee Event Report 91-12 for the Fort Calhoun Station

Please find attached Licensee Event Report 91-12 dated July 22, 1991. This report is being submitted pursuant to 10 CFR 50.73(a)(2)(iv).

If you should have any questions, please contact me.

Sincerely,

*W. G. Gates*  
W. G. Gates  
Division Manager  
Nuclear Operations

WGG/rkj

Attachment

c: R. D. Martin, NRC Regional Administrator  
W. C. Walker, NRC Project Manager  
R. P. Mullikin, NRC Senior Resident Inspector  
INPO Records Center

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## LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) Fort Calhoun Station Unit No. 1										DOCKET NUMBER (2) 0 5 0 0 0 2 1 8 5										PAGE (3) 1 OF 0 4	
TITLE (4) Emergency Diesel Generator Auto-start Due to Loss of Transformer (T1A-4)																					
EVENT DATE (5)			LER NUMBER (6)				REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)											
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES N			DOCKET NUMBER(S) 0 5 0 0 0									
0 6	2 0	9 1	9 1	0 1 2		0 0 0	7 2	2 9 1				0 5 0 0 0									
OPERATING MODE (9) 1		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR § (Check one or more of the following) (11)																			
POWER LEVEL (10) 0.55		20.402(b)				20.408(a)				X 50.73(a)(2)(iv)				73.71(b)							
		20.408(a)(1)(i)				50.38(a)(1)				50.73(a)(2)(iv)				73.71(a)							
		20.408(a)(1)(ii)				50.38(a)(2)				50.73(a)(2)(iv)				OTHER (Specify in Abstract below and in Text, NRC Form 306A)							
		20.408(a)(1)(iii)				50.73(a)(2)(i)				50.73(a)(2)(iv)(A)											
		20.408(a)(1)(iv)				50.73(a)(2)(ii)				50.73(a)(2)(iv)(B)											
		20.408(a)(1)(v)				50.73(a)(2)(iii)				50.73(a)(2)(v)											
LICENSEE CONTACT FOR THIS LER (12)																					
NAME W. J. Blessie, Shift Technical Advisor										TELEPHONE NUMBER AREA CODE 4 0 2 5 1 3 3 1 - 1 6 8 1 9 6											
COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)																					
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC											
SUPPLEMENTAL REPORT EXPECTED (14)										EXPECTED SUBMISSION DATE (15)		MONTH	DAY	YEAR							
YES (If yes, complete EXPECTED SUBMISSION DATE)										X NO											

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

On June 20, 1991, Fort Calhoun Station was operating at 55 percent power with the "B" Condenser isolated for repair work on a backwash valve (MOV-B-6B). The electrical distribution system was in its normal line up. Two electricians were troubleshooting a ground on the house service transformer (T1A-4) cooling fan, when one electrician inadvertently bumped the unlabeled Fault Pressure Auxiliary Relay (63FPX/T1A-4) inside the panel.

Energizing 63FPX/T1A-4 caused the transformer lockout relay, 86/T1A-4 to actuate, isolating the transformer from the 4160V bus 1A4. Additionally, this caused the 161KV supply breaker (Breaker 111) to open and lockout relay 86/BRK-111 to actuate as a protective measure for the 161KV supply system. As a result of the 86/T1A-4 lockout relay actuating, the Emergency Diesel Generator DG-2 auto-started and accelerated to idle speed.

The causes of this event include personnel error, an exposed relay (63FPX/T1A-4) that contained several wires in close proximity, and an unlabeled relay in the cabinet.

Corrective actions include the following: label the 63FPX relays in the cabinet for proper identification, evaluate whether a different type of relay or a cover could be used to protect the relay from actuating should it be bumped, and revise the electricians' training program to include discussion on the unique wiring configuration within the transformer panels.

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 500 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)	
Fort Calhoun Station Unit No. 1		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		
		0 5 0 0 0 2 8 5 9 1	— 0 1 2	— 0 0		

TEXT (If more space is required, use additional NRC Form 366A's) (17)

The Fort Calhoun Station (FCS) Unit No. 1 plant electrical distribution systems are designed to meet the electrical demands of the plant during normal, abnormal and accident situations. The electrical AC distribution system consists of four 4160V and nine 480V buses carrying both vital and non-vital loads.

The 4160V system consists of four electrically separated buses (1A1, 1A2, 1A3 and 1A4). Buses 1A1 and 1A2 carry only 4160V non-vital loads and are normally connected to unit auxiliary transformers T1A-1 and T1A-2 via the 22KV/345KV source. However, if the 22KV/345KV source becomes unavailable, buses 1A1 and 1A2 can be supplied from the house service transformers T1A-3 (1A1) and T1A-4 (1A2) either automatically via a fast transfer or they can be manually aligned. T1A-3 and T1A-4 are supplied from the 161KV off-site source and normally are used only to power buses 1A3 and 1A4. Buses 1A3 and 1A4 supply all engineered safeguard and essential support systems either directly or through the 480V distribution system. In the event that the 161KV off-site power source is unavailable, buses 1A3 and 1A4 can be supplied via the unit auxiliary transformers T1A-1 (1A3) and T1A-2 (1A4) either automatically via a fast transfer or manually aligned. Additionally, should both the 161KV and the 22KV/345KV sources be unavailable, buses 1A3 and 1A4 can be supplied from the emergency diesel generator associated with the bus (DG-1 for 1A3 and DG-2 for 1A4).

The 480V system is comprised of nine buses, powered from six 4160V/480V transformers. Three buses are supplied by 1A3, three buses are supplied by 1A4 and three buses are island buses that can be supplied by either 1A3 or 1A4, but not both simultaneously. Twenty-two Motor Control Centers (MCCs) receive power from the nine 480V buses. The MCCs, which are arranged throughout the plant, provide power to both safety and non-safety related equipment.

In the event of total failure of supply from the 22KV/345KV and 161KV sources, simultaneous load shedding of motor loads connected to 4160V and 480V buses is initiated by undervoltage relays. Diesel generators automatically start, run up to operating speed and voltage, and connect to buses 1A3 and 1A4. If no Design Basis Accident (DBA) exists, reloading of the system is performed manually by the operators in accordance with an Emergency Operating Procedure. If a DBA has occurred, either a Pressurizer Pressure Low Signal (PPLS) or Containment Pressure High Signal (CPHS) would cause a Safety Injection Actuation Signal (SIAS). A SIAS eliminates non-vital 4160V loads, selected MCCs and non-vital loads on other MCCs. PPLS or CPHS would also initiate the starting and loading of engineered safeguards equipment via automatic load sequencers.

On June 20, 1991, Fort Calhoun Station was operating at 55 percent power with the "B" Condenser isolated for repair work on a backwash valve (MOV-B-6B). The electrical distribution system was in its normal line up with buses 1A1 and 1A2 being supplied from the 22KV/345KV source, and buses 1A3 and 1A4 being supplied from the 161KV off-site source. Both emergency diesel generators were available for their respective buses in auto-standby. At 0730 hours CDT, two

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FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (8)			PAGE (3)	
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		
Fort Calhoun Station Unit No. 1	0 5 0 0 0 2 8 5 9 1	—	0 1 2	—	0 0	0 3 OF 0 4

TEXT (If more space is required, use additional NRC Form 365A's) (17)

electricians began troubleshooting a ground on a transformer T1A-4 cooling fan. Upon opening the control cabinet to T1A-4 to inspect the wiring, the electricians noticed that a green wire was connected to 277VAC and a white wire was connected to ground. Noticing this unique transformer wiring scheme, the electrician decided to trace the wires to verify the wires were properly connected for safety precautions. While the electrician was tracing back the wires, he unknowingly bumped the Fault Pressure Auxiliary Relay, 63FPX/T1A-4, making up the contact. The relay, which is exposed with no protective cover, is located within the cabinet near the place where the wires enter the cabinet.

Energizing the Fault Pressure Auxiliary Relay caused the transformer's lockout relay, 86/T1A-4, to actuate isolating the transformer from the 4160V bus 1A4. Additionally, this caused the 161KV supply breaker, Breaker 111, to open and lockout relay, 86/BRK-111, to actuate as a protective measure for the 161KV supply system. 161KV supply was lost to both 1A3 and 1A4 at 0805. Buses 1A3 and 1A4 successfully fast transferred to T1A-1 and T1A-2, respectfully, and were being supplied from the 22KV Main Generator. DG-2 started and accelerated to idle speed as a result of 86/T1A-4 lockout relay actuating, but did not load onto the bus.

After control room operators verified the electrical line up, Abnormal Operating Procedure AOP-31, "All 4160V Buses Fed From 22KV", was entered at 0809. Realizing that power was unavailable from the 161KV source due to the actuation of the lockout relays, Technical Specification Limiting Conditions for Operability (LCO) 2.7(2)(b) was entered at 0823. This LCO enables both transformers, T1A-3 and T1A-4, to be out of service for up to 24 hours provided that both diesel generators' operability is immediately determined and the NRC notified immediately. At 0835, DG-1 was manually started to verify operability and at 0842 per the Technical Specification 2.7(2)(b) requirements, the NRC was notified of this event.

Both electricians noticed that the transformer had stopped "humming" and contacted the control room to verify if there was any problem. The electricians were informed of the loss of 161KV and the job was stopped. Electrical Maintenance and System Protection were notified to investigate the pressure alarm and determine if the alarm could have been valid. Following an investigation, which determined that the actuation of the Fault Pressure Auxiliary Relay was not a result of any increase in pressure, the System Protection technician gave permission to reset the lockout relays 86/BKR-111 and 86/T1A-4. The system line up was returned to normal configuration at 1041.

Once the system was returned to normal, the 24 hour LCO per Technical Specification 2.7(2)(b) was exited, and DG-2 was shutdown. A four hour report pursuant to 10 CFR 50.72(b)(2)(ii) was made at 1128 hours as a result of DG-2 auto starting when T1A-4 lockout relay actuated. This report is being submitted pursuant to 10 CFR 50.73(a)(2)(iv).

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FACILITY NAME (1)  Fort Calhoun Station Unit No. 1	DOCKET NUMBER (2)  0500028591-012-01004 OF 04	LER NUMBER (6)		PAGE (3)	
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TEXT (If more space is required, use additional NRC Form 366A's) (17)

The safety significance of this event is low since buses 1A3 and 1A4 successfully fast transferred to their respective back up power sources. All safety systems operated as expected, and operator responses were timely and effective. The fact that DG-2 started and came up to idle speed would not have hampered the diesel generator from loading onto the bus if needed. DG-1 did not auto start because it was not designed to start for this scenario.

The Human Performance Evaluation System (HPES) was used to evaluate the causes of this event. The HPES identified the following as contributing factors: the electricians were unaware of the color code used on the transformer and that the relay would trip the 161KV supply; the electricians, confused by the wire color coding of the transformer, began tracing the wires and bumped the relay; and, the electricians were unaware of the consequences of their actions. The causes that led to this event were: 1) the transformer panel wiring diagram did not provide the color coding scheme of the transformer panel or the name and/or function of the relay; 2) the relay was exposed with no protective cover and contained several wires in close proximity; and 3) a similar event as described in LER 87-008, dated April 20, 1987, did not identify corrective action to address the inadequacy of the relay design.

The five main transformers (T1, T1A-1, T1A-2, T1A-3, and T1A-4) have similar wiring schemes and Fault Pressure Auxiliary Relays, therefore, the corrective actions listed below will apply to all five transformers.

The following corrective actions will be implemented as a result of this event:

- 1) Electrical Maintenance supervision will discuss the wire color code in a department safety meeting by September 1, 1991.
- 2) System Engineering will evaluate whether a cover or a different type of relay could be used to protect the relay from actuating should it be bumped, by December 31, 1991.
- 3) The 63FPX relays will be labeled for proper identification by September 1, 1991.
- 4) Include into the electricians' training program discussion on the unique wiring configuration within the transformer panels by December 31, 1991.

Other events involving inadvertent starting of an Emergency Diesel Generator at Fort Calhoun Station were reported in LERs 87-008, 87-009, 88-007, 88-014, 88-024, 90-006, 90-010, 90-012 and 90-019.